IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF:

ANTHONY J. KINNEY ET AL.	CASE NO.: BB1538USNA
SERIAL NO.: 10/776311	GROUP ART UNIT: 1638
FILED: FEBRUARY 11, 2004	EXAMINER: FOX, DAVID T.

FOR: PRODUCTION OF VERY LONG CHAIN POLYUNSATURATED FATTY ACIDS IN OIL SEED PLANTS

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Declaration of Dr. Anthony John Kinney Pursuant to 37 CFR 1.132

I, Anthony John Kinney do hereby declare as follows:

1. I am a citizen of the United Kingdom and am a permanent resident of the United States of America, residing at 609 Lore Avenue, Wilmington, Delaware 19809.

2. I received a B. Sc. in biology from the University of Sussex in 1980 and a D. Phil. in biochemistry and cell biology from Oxford University in 1985.

3. I served as a research fellow in the Department of Food Science at Rutgers University, New Brunswick, N.J. 9/87-5/89.

4. I have been employed at E. I. du Pont de Nemours and Company (DuPont) since June 1989 and presently work as a principal investigator for DuPont's agricultural products and am presently working on expression of storage oil genes.

5. I have authored in excess of fifteen refereed articles in the field of biochemistry.

6. I have reviewed the above-identified case, and the Official Action for the subject case dated January 25, 2007. I understand that this declaration is being submitted to address the rejections of the pending claims

under 35 USC §112, first paragraph, and the concerns raised during the interview held on February 13, 2007. Specifically, this declaration is intended to demonstrate that there are a variety of genes (from various sources) and combinations thereof that can be used to engineer the production of omega-3 fatty acids in oilseed crops.

It should be noted at the outset that the claimed invention really constitutes a pioneering invention which has provided a foundation to help other researchers to engineer the production of omega-3 fatty acids in oilseed crops. Prior to this disclosure, the possibility that one could produce long chain omega-3 fatty acids in the oil fraction of seeds was not known.

The references discussed below all refer to and cite the ground-breaking work that is disclosed and claimed in the above-identified application. I truly believe that accomplishments achieved in my laboratory in this area are at the forefront of work in this field as evidenced by the extent to which others have relied and continue to rely on research foundation that we have provided.

Submitted herewith is a copy of an article co-authored by the undersigned and Dr. Howard G. Damude who are also co-inventors of the above-identified application. This article was published recently in Lipids on or about March 14, 2007 and is entitled "Engineering oilseed plants for a sustainable, land-based source of long chain polyunsaturated fatty acids."

Attention is kindly invited to the bottom of page3, second column of the article specifically, the section labeled "Engineering omega-3 LCPUFA into Plants: Fatty Acid Biosynthetic Pathways." This section presents a nice overview of information available to those skilled in the art. It is stated on page 8 that:

> In contrast to PKS synthases, the pathways of aerobic ARA, EPA and DHA synthesis use a series of individual desaturase and elongase activities to catalyze the conversion of LNA and ALA to LCPUFA (34). For ARA and EPA synthesis this requires the addition of 2 carbons and two double-bonds to LNA and ALA respectively. ARA can be converted to EPA by the action of a third (omega-3) desaturase (35).
>
> Two converging ARA/EPA pathways have been identified in LCPUFA-producing organisms (*Figure 1*); in both pathway types LNA and ALA are the metabolic precursors. In the first pathway type, LNA and ALA are first desaturated to gamma-linolenic acid [GLA, 18:3(6,9,12)] and stearidonic acid [STA, 18:4(6,9,12,15)], respectively, by a delta-6 fatty acid desaturase. These fatty acids are then elongated

> to 20-carbons by a microsomal fatty acid elongation complex (28). This elongation is initiated by a delta-6 specific beta-ketoacyl-CoA synthase enzyme (delta-6 elongase). The 20-carbon ketoacyl-CoA is then reduced, dehydrated and reduced again by the elongation complex to yield dihomo-gamma-linolenic acid [DGLA, 20:3(8,11,14)] or eicosatetraenoic acid [ETA, 20:4(8,11,14,17)]. These fatty acids are then desaturated to ARA and EPA respectively by a delta-5 desaturase.
>
> In the second pathway type, LNA and ALA are first elongated by a delta-9-specific elongase to eicosadienoic acid [EDA, 20:2(11,14)] and eicosatrienoic acid [ERA, 20:3(11,14,17)], followed by delta-8 desaturation to DGLA and ETA, respectively. As in the first pathway, these fatty acids are then desaturated to ARA and EPA respectively by a delta-5 desaturase.
>
> Independent of the aerobic pathway utilized, some organisms have the added capability of efficiently converting omega-6 fatty acids to omega-3 fatty acids by the action of an omega-3 fatty acid desaturase (35-39). This desaturation can occur on either 18-carbon or 20-carbon fatty acids. . . .

It is noted in this article on page 4, column 2, that the soybean study, described in WO 2004/071467 which is the PCT equivalent of the above-identified application, involved characterization of multiple seed-specific promoters and LCPUFA synthetic genes from different microbial sources in addition to optimization of promoter-gene cassette combinations and orientations in soy.

Several references were discussed at the above-referenced February 13 interview.

Robert et al. is one of the references that was discussed during the above-identified interview held on February 23, 2007 and in the last Office Action and previously filed response.

Attention is kindly invited to Table 1 appearing on page 105 of Robert et al. This table presents a summary of genes, host plants and reported LCPUFA proportions in seeds of transgenic plants.

Another reference that was discussed is Napier et al., Physiologia Plantarum 126:398-406 (2006) which is a review of plant metabolic engineering of very long-chain polyunsaturated fatty acids in transgenic plants. The research that I and my group conducted and which constitutes the subject matter of the above-identified application is discussed on page 402, second column through the first column on page 403. The work of Roberts et al. and Wu et al. is also discussed. This review shows that a

variety of approaches using different genes and combinations thereof to make transgenic plants producing very long-chain polyunsaturated fatty acids.

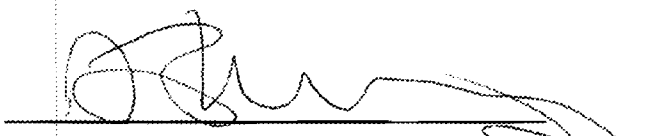
One other reference that was discussed at this interview was Wu et al., Nature Biotechnology 23(8):1013-1017 (August 2005). This is the same work mentioned by Roberts et al. and Napier et al. Wu et al. discussed the transgenic production of arachidonic acid in Brassica juncea seeds.

Parenthetically, a question was raised at the interview regarding sources of a delta-17 desaturase other than Saprolgenia diclina. A publication from Spychalla et al. PNAS 94:1142-1147 (1997) describing a delta-17 from C. elegans was mentioned during the conversation. A copy of this reference is attached hereto.

Attention is also kindly invited to Wu et al. which describes the use of an omega-3 desaturase (D17 desaturase) from Phytophtora infestans (Acc# CS160901) and EPA increases from average of 1.4% to 8.1% with concurrent decrease in ARA (also WO 2005/083093)

It is respectfully submitted that in view of the foregoing, it should be clear that there are variety of genes and combinations thereof can be utilized to engineer oilseed crops to produce LCPUFAs in oilseed plants. This observation is further depicted in Figure 1 of the above-identified pre-publication.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



DR. ANTHONY JOHN KINNEY

Date: 23 MARCH 2007